AN ENVIRONMENTAL COMPLIANCE ASSISTANCE SPOTLIGHT

MAC FARMS

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MAC Farms is creating green energy with an anaerobic digester and diverting waste from landfills.

Top left: Receiving mix tank. Top Right: Anaerobic digester. Bottom Left: Secondary digestion bladder. Bottom Right: Reciprocating engine

MAC Farms, a fourth-generation family farm in Campbellsville, is primarily a broiler chicken operation owned by John McLean. MAC Farms operates eight chicken houses with approximately 21,000 broilers per house.

In an effort to be sustainable in his chicken operations, McLean constructed an anaerobic digestion system for MAC Farms. Anaerobic digestion is the process by which bacteria is used to break down organic materials, such as animal or food waste, into methane and other gases, which can be used to produce electricity or heat. This process happens in a sealed, oxygen-free tank called an anaerobic digester. It's a common technology used in agriculture, municipal waste and brewing industries. The bio-solids for MAC Farms' digester include chicken litter, generated from the houses on-site. They can also accept materials from other locations, including manure, crops and crop residue and other agricultural by-products, in addition to distiller's grain, food carbohydrates and sugar.

MAC Farms has a three-way contract with Taylor County RECC to use its power lines to transmit electricity produced by the digester system to East Kentucky Power. McLean worked with Eagle Green Energy to create the initial design for the entire digester-to-electricity project and continues working with them. The system includes an enclosed mix tank, primary anaerobic digester and secondary bladder. The mix tank and primary digester are heated with a boiler that can use natural gas or biogas and which may operate on digester gas in the future. The digester gas, collected in the bladder, is routed to a reciprocating engine to generate electricity. Electricity generated is then fed to the power grid and sold to the local power company.

Anaerobic digesters are used to facilitate the production of green energy and for landfill diversion of waste. MAC Farms' anaerobic digestion system creates a digestate, which is the nongaseous product from the secondary bladder that can be used to apply to land as a soil

Key to Success

Though success may demand patience, creativity and determination, the environmental rewards are worth the effort.

amendment. The entire process from anaerobic digester to energy-generating engine is an effort in waste reduction and green energy generation, often referred to as a waste-to-product process.

Although the farm now uses more energy than McLean produces, eventually he will produce 2.5 million killowatts, with an ultimate goal of 3,408,000 killowatts. This will far exceed the farm's energy requirement.

"For others who are considering a project like this, prepare yourself for a long process," advises McLean, who has been working on this for four years. "Challenges will arise. No two digesters are the same. The biggest short-term challenge at the beginning is the cash flow. But, I have extreme confidence that the cash flow will come. You have to intensively manage your funds."

Many agencies need to be contacted for an operation of this type. McLean says there are also daily facility challenges, and you must have one person dedicated to this process and problem-solving. McLean says Brian Hayes, a MAC Farms employee, knows as much as he does about the system and keeps the process running efficiently. Additionally, when staff from the Division for Air Quality and Division of Waste Management visited MAC Farms, they were pleased with the operation and its intent.

When McLean had questions about permitting his operations, the Department of Energy Development and Independence suggested that he call the Environmental Compliance Assistance Program (ECAP) for answers. McLean found that one of the benefits of working with ECAP is that the staff is knowledgeable about the process of applying for permits since they network on a daily basis with people in the permit processing unit of the Department for Environmental Protection. ECAP assisted MAC Farms with the initial air quality application and conducted an assessment of the entire facility for potentially applicable Department for Environmental Protection regulations.

"I want to do things the right way, so when we changed a generator, I called Emily from ECAP with questions," says McLean. "Then I called her prior to applying for the permit, and she prepared the paperwork for me. When I received the papers, I read over them to check the information, signed the form and returned it. I was sick of applications, but Emily made the process easier."

John McLean is passionate about the environment and renewable energy. He's chairman of the Board of Supervisors of the Taylor County Conservation District and winner of the 2015 Ag Person of the Year Award from the Taylor County Cooperative Extension Service. McLean believes people shouldn't do something just for the economic gain, but should do it for the benefit of the environment, too.

LEFT: The poultry houses, which supply litter to feed the digester. RIGHT: Power lines at MAC Farms transport electricity to the local power company.